THE TEXTILE WORLD RECORD
KINK BOOKS

No. 4

Kinks on Worsted Combing, Drawing and Spinning

COMPILED FROM THE
QUESTIONS AND ANSWERS DEPARTMENT
OF THE
TEXTILE WORLD RECORD

PRICE 75 CENTS

LORD & NAGLE COMPANY
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Boston, Mass., U. S. A.

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COMPILED AND EDITED BY

CLARENCE HUTTON

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PREFACE.

In compiling this book the aim has been to give the unusual out-of-the-way information on worsted combing, drawing and spinning that results from long experience.

The editors of the TEXTILE WORLD RECORD are at all times face to face with the problem of securing practical information. For years its subscribers have been invited to make free use of its columns in asking questions relating to textile manufacturing and it occurred to us that if some of the most important and most interesting of the practical questions that have been answered were gathered together in a handy form for quick reference it would meet a widespread want.

This book is the result. It contains information which has been supplied by manufacturers, superintendents and overseers from their private record books and their stores of knowledge gained by experience. Many questions are answered and much information given, but subscribers should remember that if there is any information they desire which is not given in this volume, it is their privilege to ask the Questions and Answers Department of the TEXTILE WORLD RECORD and every effort will be made to publish the information they want, provided the question is one of general interest to the trade.

No effort has been made to group the questions and answers relating to the different operations in worsted yarn manufacture in

any part of the book. The index has been carefully prepared, however, and its use should enable anyone to secure the information he seeks in the shortest possible time.

Grateful acknowledgment is due to the men who have supplied the information and if Kinks on Worsted Combing, Drawing and Spinning should benefit any of the large number of men for whom it is intended, both they and the publishers will feel that its mission has been accomplished.

TEXTILE WORLD RECORD.
Lord & Nagle Company,
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Kinks on Worsted Yarn Manufacture

Standardizing Drawing Machinery

I have recently taken charge of drawing at this mill. I find it is necessary to go through a separate process of calculation for each machine when any change is made in the lot. Kindly tell me whether it is usual to have machines geared so that the same change wheel will give the same draft on all the boxes.

Wilson (2191).

It is a good plan when taking charge of a drawing plant, whether open or French, to standardize the machines and by testing determine whether a given change wheel will give the same amount of draft on all the boxes. If not, the sooner the difficulty is remedied the better. This is neither as difficult nor as expensive as it may appear to be at first sight. The front and back rollers are usually made the same size for the same boxes by all the leading makers. The greatest difference is in the so-called standard and double stud wheels. If these are made uniform, it does not matter which set may be going on a new run.

When the overseer has settled what draft or twist is required he can easily find what change wheel to use for the required count by merely looking up his table of relations between change wheel and counts. As most change wheels are plainly stamped with the number of teeth, he can easily see whether his orders have been carried out or not.

It is also necessary to have standard samples of the different qualities of material, so as to be at any time ready to deal with a repeat order. J. B.

Drafting Worsted

What is the rule followed in finding drafts in the drawing room? We have run about the same thing for months and are putting on a new lot. Childs (2132).

In judging how much draft wool will stand in the drawing for worsted yarn, several factors have to be taken into account. If we take the generally accepted standard that wool will always stand a draft equal to its length, allowances have to be made for the difference in the staples of various growths, and for the various proportions of long and short fibers contained in each. Taking the ordinary Bradford 60s as our standard, a staple top may have fibers 5 1/2, 5, 4, 3 and even 2 inches long.

Before combing (still working on the average of ordinary 60s) the draft in the back-

wash gill should not be more than 4 1/2 to 1; and in gilling operations before Noble combs, 5 to 1 in first gill and about 5 1/2 to 1 in second gill.

A good plan to determine what draft to use with a new lot is to dissect a few staples on a pulling board, Fig. 1. Then if a good diagram, Fig. 2, is obtained, draft to full extent. If a poor diagram is obtained, Fig. 3, showing

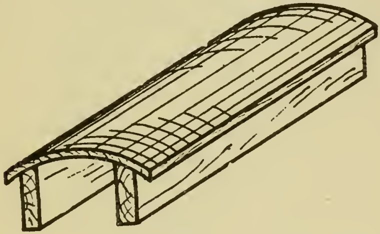

FIG. 1

a large proportion of short fibers, the draft should be shorter or the result will be uneven and twitty yarn.

To get a diagram, break off a piece of sliver from the top to test for the drawing. Or take an average pull from the sliver off the card to test for draft to be used in gilling before combing. Pressing one end of staple firmly on pulling board with thumb of left hand, draw the staple across board with right hand. The longest fibers will be laid on

the board. Repeat this operation until nothing is left in the right hand. The diagram is then complete. The board should be covered with velvet which forms a good surface for holding the fibers in position.

The quality of wool is determined by the fineness or diameter of the fiber. This is misleading to some extent. The staple shown in Fig. 2 would easily spin to 60s count. Fig. 3, although equally as fine, would not make a satisfactory yarn if drawn to more than 50s.

It follows that good judgment must be used in drafting. In making up a drawing, tops of various qualities and lengths of staple are blended to make a standard. The object of drafting is to distribute the shorter fibers so that an even sliver or thread may be produced. It would be possible to set the front and back rollers of a machine so that top measuring 2 1/2 yards to the ounce could be drawn down to the thickness of roving at one operation, but it would be so uneven as to be practically useless. This is the reason why in drawing, from 8 to 10 or 11 processes are used, varying with the qualities of the material in hand.

If good work must be done one rule must be observed in all drafting operations from the time the wool leaves the card until it leaves the spinning frame or mule. The sliver must not travel in the same direction in any two consecutive operations. Previous

to the introduction of the automatic creel, all tops had to be unwound after leaving the comb before going through the first gill in drawing. The reason for this is that the ratch or distance between delivery and draw-

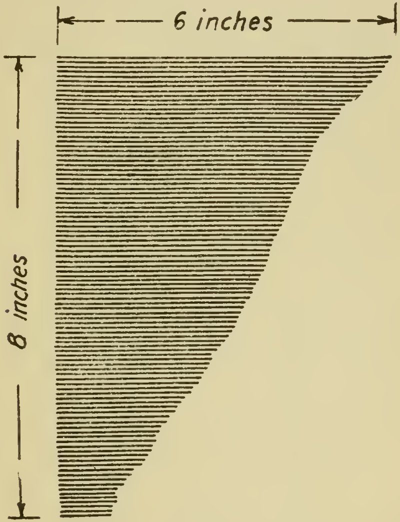

FIG. 2

ing rollers has always to be longer than even the longest fibers in the staple. Notwithstanding gills in early processes and carriers in the later ones there is always a danger of the shorter fibers being pulled through in a body

with a tendency to make thin places. By turning the sliver at each operation most of this difficulty is overcome.

If the draft is too short in the early processes, the sliver when opened and held to the light has a dull, cloudy appearance. If too much draft is used the sliver shows decided unevenness, with thin and thick places, which can easily be detected by drawing the sliver through the hand.

The methods of regulating draft are all practically on one principle, i. e., the speeding up or slowing down of the front roller. In backwashing, gilling and finishing in the combing processes and in gill boxes in the early stages of drawing, the fallers set the pace and both delivery and drawing off are variable quantities. The back rollers in all these cases must be set at such a speed that the fallers have a slight lead. This needs careful watching, for, if the lead is not enough, the wool does not get well down into the pins, and some of it will ride over the points altogether. If, on the other hand, there is too much lead the fallers will disarrange the shorter fibers and bad sliver will be the result.

It must always be remembered that gilling is not a combing process; and that if the wool is not cleared in the comb itself, the subsequent operations cannot remedy that fault. In the later stages of drawing and

spinning the speed of the cylinder is the fixed point and both draft and twist alterations are based on this speed.

Another point to be remembered in drafting, particularly in short, fine wools, is that in the case of gills the front roller should always be set as near to the faller as possible, except in

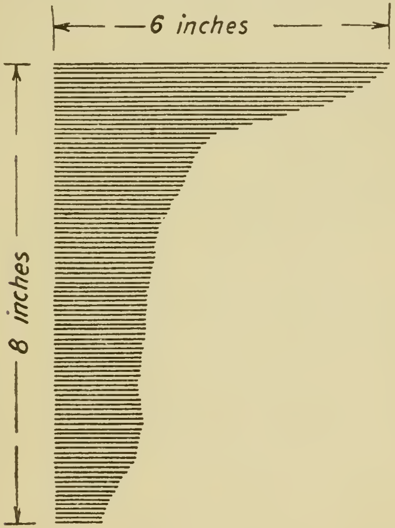

FIG. 3

processes just after backwashing, where if wool is delivered too damp there is danger of plucking.

In reducing, roving and spinning, where the front rollers are a fixture, the last set of carriers must be set as near the nip of the front roller as possible. The object is to hold the shorter fibers in staple or thread until the last moment so as to prevent their being dragged and so causing unevenness. Of course the same rule holds good in boxes where porcupines are used in place of gills or carriers.

A good 60s giving a diagram like Fig. 2 will stand a draft of 6 all through the 10 processes of drawing, but always finish off with roving light enough to be able to spin with a low rather than too high a draft. Overdrafting in the spinning is an evil, and as this is the final process before passing into the piece the defect cannot be remedied. With a 6 draft, allowance is made for alterations, either up or down, at the first and second weigh boxes and spinning frame.

When the count and the weight per ten yards of top are given, the number of processes and ends up at each operation may be determined by the amount of the draft the wool will stand. Thus if it is a poor short lot and will not stand over 5 draft and if the yarn is to be 60s, the number of ends put up in earlier processes will have to be reduced, resulting in reduced production.

If it is found on examining the sliver at any given box that it appears to be either over or underdrafted, and if the draft is not

known, a simple method of getting the exact draft, which always varies slightly from the theoretical draft given by counts of wheels and size of rollers, is to mark off say one foot of sliver as it is being fed to back rollers, break the sliver off close to the front roller, then let the box run until the mark gets to back roller. If the amount delivered by the front roller is then carefully measured the exact draft is arrived at.

Then by a simple proportion the wheel required to give either a larger or smaller draft is easily determined. If a 20 change wheel on back shaft in gill boxes gives a draft of 4 to 1 and a draft of 5 is required, the new gear is easily calculated: $(20 \times 5) \div 4 = 25$ wheel required.

This saves calculating all the wheels and rollers in the box, assuming that the draft between faller and back roller is just sufficient to lay the wool well into the pins of fallers, an adjustment which, when once arrived at, does not need alteration except in extreme cases, as when changing from a lot that lies straight and even to a sort that is fluffy and springy, or the reverse. E. A. B.

Grading Worsted Wool

Can you tell me how the various qualities of worsted wool are known and sorted out? We handle tops ranging from 44s to 60s quality; how shall I designate between a 44s and 46s

and other qualities which follow in numbers so close together? Sorter (1246).

In classing and sorting wool for use in worsted manufacturing much attention is paid to the soundness and uniform length of staple and fineness of fiber. In blending, the waviness and serrations of fiber are of great value and, along with the fineness, are considered because they allow the fewest possible fibers to adhere together firmly when twisted into a thread, thus producing the greatest possible length of yarn from a given weight of top. Waviness is the crimp, or curl in wool. Wool with large, smooth scales is preferable for luster effects as they reflect the light and add to the bright appearance so requisite in worsted fabrics. As far as possible uniform length and soundness should be aimed at to insure good spinning power. Fineness to give the soft handle, and straightness in arrangement of fiber all tend to bright, clear appearance which is so desirable in a well made and finished worsted cloth.

Nothing but the trained hand and eye of an expert wool sorter can distinguish between a 44s and 46s quality. The 46s should have a larger proportion of wavy fibers. Counts do not depend entirely upon quality, but on the number of yards of yarn in 12 1/2 grains. Thus with 44s yarn 44 yards weigh 12 1/2 grains, and with 60s yarn 60 yards gives the same weight. Although there should not be

much difficulty in spinning a fairly good 46s out of a standard 44s top it is not wise to spin up to any great extent. Although it would be difficult to spin good 52s out of a 44s, a fine top can be spun down without limit, that is, there would be no difficulty in spinning a 16s out of a 50s top. J. B.

Calculating from Top to Yarn

I would like an explanation of the method of calculating the weight of worsted from top to yarn. Slubber (757).

Although the size of worsted yarn is indicated by the number of 560-yard lengths per pound, that is, by a fixed weight system, it is customary to indicate the sizes of top, drawing and roving by a fixed length system. For this latter purpose a fixed length of 40 yards is ordinarily used and the weight expressed usually in drams (1/16 ounce), sometimes in grains. A fixed length is so used because of the convenience of making the frequent tests of the sizes of material in process. These tests can be made in no other way as easily as by measuring a given length and then weighing it. Forty yards has been generally adopted because it is a convenient length for the purpose. It has the advantage of being one-fourteenth of 560 yards. The worsted count is, consequently, equal to the number of 40-yard lengths in 500 grains (1/14

lb.) and is found by dividing 500 (grains in 1/14 lb.) by the grains in 40 yards. Conversely the grains in 40 yards are found by dividing 500 by the worsted count; the drams in 40 yards by dividing 18 2/7 by the worsted count. Thus:

500 ÷ Wors. No. = Grains per 40 yards.

18 2/7 ÷ Wors. No. = Drams per 40 yards.

500 ÷ grains per 40 yards = Wors. No.

18 2/7 ÷ drams per 40 yards = Wors. No.

The draft of worsted in process is the ratio between the speed at which the strand enters the machine and that at which it is delivered. If the front rollers deliver 5 yards of roving while the back rollers take in 1 yard, the draft of the machine is 5. The strand as delivered will in that case be one-fifth the size of the strand entering the back rollers. In other words, a given length from the front rollers will weigh one-fifth as much as the same length of the strand entering the back rollers. If a slubbing weighing 16 drams per 40 yards enters a roving frame having a draft of 8, the roving delivered will weigh (16 ÷ 8) 2 drams per 40 yards. In practice, however, two or more ends enter the drawing box or frame together and are drawn into one strand. This makes it necessary to multiply the weight of the single strand at the back rollers by the number of ends to determine the total weight of the strands drawn into a single strand. If two ends of slubbing were drawn into one end

of roving in the preceding example, the size of the roving would be found as follows:

16 (drams) × 2 (ends) = 32 drams.

32 (drams) ÷ 8 (draft) = 4 dram roving.

In the following table the drafts of a top weighing 256 drams (16 ounces) per 40 yards are illustrated for the eight successive processes including spinning.

Process	Drams Entering	Doublings	Draft	Drams Delivered
1	256	6	6	256
2	256	6	6	256
3	256	5	8	160
4	160	4	8	80
5	80	4	8	40
6	40	2	8	10
7	10	2	8	2½
Spinning	2½	2	10	½

The calculations of these weights are made as already explained in the case of the 4-dram slubbing. The spinning frame delivers a yarn weighing one-half dram per 40 yards. The count of the yarn is thus found as already explained:

18.3 ÷ .5 = 36.6 Wors. No.

It is evident that in calculating backward from yarn to top the process must be reversed. To find the weight of roving required to produce a 1/2 dram yarn with 2 ends at back and a draft of 10 the process is as follows:

1/2 (dram) × 10 (draft) = 5 drams per 40 yards of 2 ends.

5 (drams) ÷ 2 (ends) = 2 1/2 drams per 40 yards single.

If, as is sometimes the case, the size of the sliver in process is indicated by the fixed weight system, say by the hanks per pound, the calculation is reversed. The following example illustrates this:

Ex. Find the size of yarn spun from 2 ends of 7-hank roving with a draft of 10.

7 (hank, single) ÷ 2 = 3 1/2 hank, double.

3 1/2 (hank) × 10 = 35 hank yarn, Wors. No.

Conversely:

35 (Wors. No.) ÷ 10 = 3 1/2 hank, double.

3 1/2 (hank) × 2 = 7 hank, single roving.

The hank or fixed weight system, however, is inconvenient for worsted in process because, as already stated, the tests of the slivers for size must be made by a fixed length, ordinarily 40 yards. The calculations with the grain standard (grains per 40 yards usually) are made in the same manner as with the dram standard.

Twist in Worsted Yarn

Some time ago I saw an article in the Textile World Record on calculating the twist in worsted yarns. I am under the impression this was translated from a foreign publication. If possible, will you reprint it or send me a ccpy? Ward (2148).

The article referred to by Ward follows: Calculation of the twist of yarn, no matter

what the material may be, is based on the yarn count. The yarn count is in inverse proportion to the cross section area of the thread. For example, the sectional area of No. 20 yarn is double that of No. 40. It follows from this that the square root of the yarn count is the correct basis for calculating the number of turns of twist. The square root of the count is multiplied by the coefficient, c, which is determined by experiment to suit the requirements of the yarn. Experience has shown, however, that by this method the higher numbers have proportionately less twist than the lower numbers. To remedy this a gradual increase in the coefficient has been proposed.

Another and better method consists in decreasing the square root by a constant number. This results in a proportionately greater twist for the higher counts as is shown by the following illustration. It is assumed that 20 turns per inch is the right twist for No. 45 worsted yarn. Then:

$\sqrt{45} = 6.708.$

$20 \div 6.708 = 3$, constant.

Calculating with this constant the twist of 30, 45 and 60, we have the following:

$\sqrt{30} \times 3 = 16\ 1/2$, turns per inch.

$\sqrt{45} \times 3 = 20$, turns per inch.

$\sqrt{60} \times 3 = 23$, turns per inch.

As has been stated, this method results in giving the higher numbers a softer twist than

is given to the lower counts. By reducing the square root by the constant 1, for example, a new twist constant is found as follows:

$\sqrt{45} - 1 = 5.708$.

20 (turns) $\div$ 5.708 $\doteq$ 3 1/2, twist constant. Then,

$(\sqrt{30} - 1) \times 3\ 1/2 = 15\ 1/2$, turns per inch.

$(\sqrt{45} - 1) \times 3\ 1/2 = 20$, turns per inch.

$(\sqrt{60} - 1) \times 3\ 1/2 = 23\ 1/2$, turns per inch.

In this way the twist in the 45s remains the same; that in the 30s is slightly reduced, while the twist in the 60s is increased slightly. The size of the twist constant must of course be made to suit the requirements of the yarn.

When calculating the twist of ply yarn by this method the resulting count of the ply yarn is used. Thus,

2/40s would be 20s.

3/40s would be 13 1/3.

4/40s would be 10, etc.

The size of the constant, which is subtracted from the square root, varies with the number of ply. For single yarn, as we have said, it is 1; for 2-ply, 1/2; 3-ply, 1/3; 4-ply, 1/4.

Adding Moisture in Finishing

In finishing worsted top is it better to add the moisture on the first or the second fin-

isher? What is the standard for moisture allowed or generally recognized?

Bates (2136).

It is preferable to moisten the top in the first process, as the roller only dampens one side of the sliver in any case. If this is done in the first box the moisture gets well blended with fibers in passing through the second gill.

The following is the standard for moisture allowed, which is generally recognized:

Tops combed in oil, a regain of 19 per cent.

Tops combed without oil, a regain of 18 1/4 per cent.

John Brown.

Cost of Manufacturing Worsted Yarn

Can you tell me where I can get a table showing the labor cost in worsted spinning? We are not spinners, but I wish to get some information that will help me to find percentage cost of labor and general expenses of yarn production.

Worsted (73).

The labor cost of manufacturing 3/8-blood worsted yarn, spun to about No. 32, is as follows in this locality at this time. The estimate is based upon about 5,000 pounds of yarn.

Sorting, 10,618 lbs., at 64c. per C.......$67.96
Scouring and Drying, 10,000 lbs., Grease Weight, at $1.50 per M........... 15.00
Carding and Combing, 5,655 lbs., Top, at $1.30 per C...................... 73.52

Drawing, 5,372 lbs., Roving, at $1.75 per C.	94.01
Spinning, 5,372 lbs., Roving at $2.00 per C.	107.44
Twisting, 5,090 lbs., Yarn, at $2.50 per C.	127.25
Spooling, 5,090 lbs., Yarn, $1.75 per C.	89.08
	$574.26

Warp, 5,090 lbs., at 11.28 cents per lb.
Extra for winding filling at .6c. per lb.
Total labor, at 11.88 cents per lb.

The above includes only the labor cost for the various processes. The general expense varies very much in different mills, and we should say that three cents per pound would be ample to cover the expenses outside of those given in the table above. This would make the cost of manufacturing 2/32s worsted yarn 14.88 cents per pound.

Duncan.

. . .

I have read with much interest your reply to "Worsted" regarding the cost of manufacturing worsted yarn. Your estimate is about right, so far as the average mill goes, but labor conditions and mill equipment vary so much in different mills that it is possible for some mills to manufacture yarn at a less cost than others. The last six or nine months have been a time of very close figuring on the

part of worsted spinners to make both ends meet, as the price of yarn has been down nearly to the cost of top. Take, for instance, the case which you cited, of a small plant, with a weekly production of 5,090 pounds 2/32s. If this production can be turned out at a cost of 12.88 cents, instead of 14.88 cents, it will make a difference of $101.80 per week, which is frequently enough to turn the scale from a profit to a loss.

Falcon.

Hints on Backwashing

I am in a position where a good, general consideration of backwashing by a practical man, covering liquors, drying, gilling and handling after backwashing, would be of great help. Can you give me this?

Wisgill (2040).

The reason why carded worsted wool is backwashed is that any dust or dirt remaining after carding shall be removed, and thus a brighter appearance be given to the finished top.

It should be borne in mind that backwashing is simply a rinsing and by no means a scouring process. The rinsing is just sufficient to wash out all traces of oil used in carding, and any other loose matter adhering to the fibers. In order that this may be efficiently done, the slivers should enter the bath or bowl free from all twist, and as open and

flat as possible. Where the slivers are brought to the backwasher in cans direct from coilers on cards, this is an easy matter. If the sliver from the cards is made into balls, they should be put into creels and under no circumstances should the sliver be drawn from the inside of the ball; otherwise the twist formed will to some extent hinder the liquor from getting into, and passing freely away from the sliver at squeeze or nip of rollers.

For the liquor the water should be pure. The best and most economical way of obtaining a supply of water is to have a tank, into which all the condensed water from steam traps attached to combs and cylinder steam service can be run. This should provide about as much water as is required, and besides requiring less soap, owing to its softness, the water will also be warm, thus requiring less live steam to bring it up to the required temperature.

If the tank is fixed on brackets or pillars, slightly higher than the top of the bowl level, no pumping or forcing will be required.

The cleansing should be accomplished chiefly in the first bowl. The amount of soap varies with the different qualities of wool, so no definite formula can be given. In the second or finishing bowl, only enough soap to enable the wool to pass through squeeze rollers without cutting or fraying should be used.

Although low qualities of soap with a high percentage of cotton seed oil may be used for some classes of wool in the scouring process before carding, the best soap obtainable should alone be used for backwashing. It should be noted that the best soap has the lowest scouring power. Appended is an analysis of three standard makes of soap for backwashing purposes:

	A	B	C
Water	44.00	40.80	56.80
Fatty matter, uusaponified	.70	.50	.40
Fatty matter, saponified	43.23	46.23	33.71
Free caustic potash	.22	none	none
Carbonate of potash	4.41	4.48	3.03
Combined potash (R_7O)	6.50	7.40	5.31
Potasium chloride	.74	.39	.65
Insoluble mineral matter	.20	.20	.1c
	100.00	100.00	100.00
Scouring yower	40	38	48

The fatty matter is olive oil with a small proportion of tallow.

In many mills when a scouring liquor has been made of the required strength the machine is started, and no further attention is paid to it, except to add a little soap from time to time, or to turn on the steam to warm the liquor, until it becomes charged with dirt and discolored. Then the machine is stopped, the old liquor run off and a new

one made. This system has many disadvantages. Besides loss of time while changing

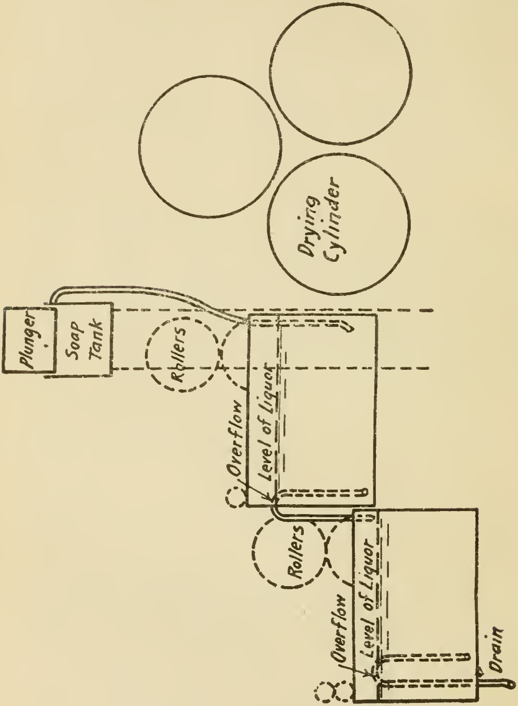

FIG. 1

the liquor, the slivers which are resting on cylinders have a tendency to scorch. There

is, moreover, a difference in color between the slivers from the old and the new liquor.

A far better method is to have a constant renewal going on all the time the machine is running, Fig. 1. This can easily be done by leaving the water valve slightly open after making the first liquor for the day, allowing enough to enter to cause a slight overflow from second to first bowl. A siphon, Fig. 1, takes the water from the bottom of the second bowl, and thus the dirtiest water runs off first. Another siphon is fixed in the first bowl, this time on the side of the bowl, and carries the dirty liquor direct to the drain.

Each bowl should have a good thermometer, fixed so that it can easily be seen by the attendant, and the liquor should be kept at an even temperature. This is a very important point, and for fine wools the temperature should not exceed 110° F.

Fig. 1 shows a soap tank fixed on a roller cross bar. This is fitted with a plunger regulated by a train of wheels, which can be altered to any speed, giving the supply of soap required. Being driven from end of roller the supply stops as soon as the machine stops. Where this system is used the soap should be diluted with two to four times its weight of water, so that it flows easily from tank to bowl.

The bottom squeeze rollers should always be

brass coated, as the difference in first cost between brass coated and all iron rollers is soon made up in the saving in lapping, and freedom from rusting when the machines have to stand for a short time. To get a better grip on the wool the brass should be slightly scratch fluted. The top roller should have an outer coating or lapping made from long Scotch wool, slightly twisted. Cotton warp lapping may cost less, but when it begins to fray, the loose fibers mixing with the wool which is passing through means damage to the dyed and finished cloth.

It is permissible in starting a new machine to use about two layers of gasket for a base, then from three to five of wool for outer lappings. The first time the rollers are stripped the gasket should be thrown aside and the bottom layers made from the lapping which has previously been used for outer covering.

Great care must be taken in lapping to have every layer as even as possible, and every round pressed firmly against the one preceding it. The nip of the rollers should be as near the level of the liquor as possible so that the slivers come to nip fully charged with liquor. By having the water suddenly forced out of the sliver there is a better chance for any loose dirt to be cleared off than if most of the water has drained off before coming to the nip.

All rollers should be dead-weighted, thus

securing an even pressure whatever bulk of wool is going through, minimizing any danger of cutting. With some classes of open wool there is at times a tendency for the sliver to cling to the roller and form a lap which may lead to serious consequences. A good way of detecting this difficulty is to have a bell fixed to the framework of the machine near the extreme end of the weight lever, with a projecting finger over the end of the lever. When any extra thickness raises the weight lever above its normal position, the bell is rung and the attention of the attendant is at once called to the trouble.

Whenever the rollers are stripped for relapping, all the joints and pins in compound levers should be taken out, cleaned and slightly oiled. This will prevent wear and tend to easy action of the levers.

The cylinders of backwashing machines have for some time received more attention than any other part. The cylinders of the ordinary type are of iron and consist of a highly polished shell running on a steam chest upon which it works. The wool is dried by passing from one cylinder to another, alternate sides of the sliver coming in contact with drying surface as it passes over the series of cylinders. Unfortunately, with heavy wools, the amount of heat required and the length of time that each side has to rest on the hot surface has a tendency to scorch

it. To overcome this difficulty the multiple cylinder backwasher was adopted by many firms. Still with this style only the outer surfaces of the slivers come in contact with the drying surface. When heavy loads were put through the machine the core of the sliver has been found to be only slightly drier than when it left the squeeze rollers. Recently, however, two backwashing machines have been patented in which this defect has been entirely overcome.

In both machines actual contact between wool and heating surface has been done away with, and the drying is done by a current of hot air passing entirely through the slivers, thus ensuring uniform drying of all parts. This is accomplished by making the shells of either wire gauze or perforated brass plates. Instead of the wool being dried solely by contact with surface of cylinder, in one machine hot air is forced through the apertures of the perforated surface.

In the other machine hot air is drawn through the slivers by means of an exhaust fan fixed over the top of the cylinder box. In this machine the whole of the cylinder is inclosed. Doors at the side and top enable the attendant to get at any slivers that may break. On the gearing side of the machine, which is also inclosed, thus forming a heating chamber, all steam pipes are fixed and everything about the machine tends to abolish the

uncomfortable heat which prevails in most backwashing sheds. The exhaust pipe from the fan can be taken into the open air if desired.

There is no danger of scorching. The hot air passing through slivers even when the machine is standing lifts the fibers, thus making them loftier, easier to gill and better to spin. The drying, it is claimed, is accomplished nearly 50 per cent. quicker, saving both steam and power. No more space is taken up than with the old style machine, and in both there is the greatest simplicity in manipulation.

In all classes of wool the draft in the backwash gill should be under rather than over what the wool will stand. For low classes of wool fallers pinned 12 per inch No. 16 wire will be found suitable. For fine botany sorts, up to 20 per inch with 20s wire will not be found too fine.

When the balls are taken from the backwasher they should not be thrown into wicker skips, unless the latter are lined. They should be carefully piled in boxes or bins. Any outlay in this direction is soon recouped by saving in waste.

The purest water, the best quality of soap and oil, keeping every part of the machine in the best possible condition, these are essential to the best results in backwashing.

E. A. B.

Weight of Sliver in Tops

Is there any standard of the weight of sliver in tops? If so will you tell us what it is? If there is no standard can you give the weights that are common? Weston (2186).

Varying weights of sliver are the cause of many complaints from spinners who buy tops from different sources, as it is difficult for the spinner to get satisfactory blends from varying weights of sliver.

Although there is no real standard, the following are those more generally used and are recommended by the Bradford Chamber of Commerce.

Prepared tops	7½ ozs. per 10 yds.
Carded Crossbred tops ...	6 ozs. per 10 yds.
Botany tops	4 ozs. per 10 yds.

Charles Dryden.

Oil in Combing

Kindly let me know whether the quantity and kind of oil used affects the production of machines and also give me the quantity of oil generally used. I would also like a test to determine the quantity of oil in a top.
Tenney (2196).

Careful oiling makes the wool pass more easily through the pins in the combs and fallers, and enables the comber to get a slightly better tear, and with rather less waste. As slightly longer drafts can be used in the

preparing and finishing processes, without much danger of breaking the fiber, a greater weight of wool can be put through the same machines in a given time than if the wool were combed without oil.

The oil also helps to bind the fibers together, so there is less fly or fluff. This applies also to the drawing and spinning, unless the tops have been kept in stock too long, or badly stored and the oil has become rancid. If this happens a new trouble arises for both drawer and spinner; viz., clogginess, uneven threads and the fibers clinging to fallers, leather sheets and rollers, causing a large percentage of waste.

Although it is not of vital importance that the purest olive oil be used to lubricate wool to enable it to pass more easily through the card, yet when the carded sliver has been backwashed nothing but the best Gallipoli Candia or Spanish olive oil must be used, otherwise bad after-effects will be the result.

The reason why there is nothing better than good olive oil is, that it does not dry out of the sliver, and oxidizes very slowly according as it contains much or little free oleic acid.

Most of the oils from southern Europe contain as little as 5 per cent. of free oleic acid. These may be used for the finest or any classes of wools with safety. Even oils containing up to 8 or 9 per cent. give good results, but above that there is a danger of clog-

giness, unless the tops are carried through spinning processes within a short time. The acid also has a bad effect on the pins of combs and fallers, thus costing more than the difference between a good and a poor oil.

Every consignment of oil should be carefully tested, and any showing over 8 per cent. should be rejected if intended for use on fine wools. Another reason for testing is that olive oil is often adulterated, a thing easily done and not always easy to discover, except by chemical tests. Poppy, cocoanut, rape, linseed, whale and cottonseed (most of these drying oils) are the most frequent adulterants used.

If the oil be much adulterated the following sulphuric acid tests will demonstrate it:

(1) Place 10 drops of the oil to be tested in a colorless glass vessel, and into the center drop a small drop of sulphuric acid. If the oil is pure it will assume a pale yellow appearance, which gradually changes to a yellowish green. If adulterated with poppy it turns to a deep yellow, which at length goes almost opaque.

(2) By the same test, rape oil produces a ring of greenish blue, around the drop of acid, with some light yellow brown streaks in the center.

(3) If linseed oil is present, it becomes almost black.

(4) Whale oil, when the acid is dropped

in, produces a movement in the center gradually extending over it, and at length shows a red tint with violet edges.

(5) If lard or tallow has been used as an adulterant the liquid acquires a decided brown shade.

(6) A simple test to detect the presence of cotton seed oil is to pour clean water into a shallow vessel, then let one drop of the oil to be tested fall into it. If pure Gallipoli (olive) it will at once break up into fragments. A sheet of white paper gently laid upon it, if afterwards held up to the light, will show a rose-shaped webby figure. If it be adulterated with cotton seed oil the figure will be blurred.

In testing olive soap for backwashing fine wools, if a small portion be spread upon a plate, and a few drops of sulphuric acid be put upon it, it will retain its brown color if pure. If mixed with cotton-seed it will turn red. Of course in order to obtain the exact amount of adulteration, it is necessary that the tests be carried out by a properly qualified analytical chemist, but the above roughly show the presence of adulterants.

Although there is no fixed standard for the amount of oil to be used, yet it has been found that from 2 to 3 parts of oil to 100 parts of top is about the best average, being sufficient to make the wool work freely, without being excessive.

To test a top in order to know the quantity of oil it contains, put the sample (previously weighed) into a drying oven kept at 212° until all the water is evaporated, say for half an hour. Then weigh to determine the absolute dry weight, and wash the sample carefully in a vessel containing water at about 120°, adding a little good soap. Care must be taken that no fibers escape after wringing with the hands. Again rinse in clean warm water to remove any traces of soap and wring through perfectly clean, smooth rollers. Again put the wool into the drying oven, allowing about one hour, frequently testing the weight and when all evaporation has ceased the difference in weight between the first and second dryings shows the amount of oil in the top. John Brown.

Draft of a Noble Comb

How is the draft of a Noble comb calculated? Beaver (412).

If by draft Beaver means the ratio between the speed at which the sliver is drawn from the comb and that at which it is delivered to the comb, the calculation is as follows:

Example. The top shaft of a Noble comb is running 594 revolutions per minute and is connected with the gear rack on the large circle by three driving gears, 16, 20, and 10, and three driven gears, 32, 66, and 264. The

drawing-off roller is 1 1/4 inches in diameter and is driven from the top shaft by two driving gears, 16 and 40, and two driven gears, 32 and 50. Find the draft of the comb.

594 × [(16 × 20 × 10) ÷ (32 × 66 × 264)] = 3.41.

Each press knife is so adjusted that at each revolution of the large circle, 1 inch of sliver from each end is delivered to the circle, and consequently 3.41 inches of sliver will be delivered per minute. The speed of the drawing-off roller is calculated as follows:

594 × [(16 × 40) ÷ (32 × 50)] × 1 1/4 × 22/7 = 933 inches per minute.

The draft or ratio between the speed of the drawing-off rollers and the speed of the sliver fed to the circle by each knife is found as follows:

933 (in.) ÷ 3.41 (in.) = 274, draft.

Production of Worsted Cards and Combs

What is a fair production for 10 hours on a No. 72 worsted card, 60 inches wide and also what is the production of a Noble comb on 1/4 blood stock and on low 1/4 blood? What wages are paid to comb tenders?

Otter (854).

A production of 1,000 pounds in ten hours is a fair average for a No. 72 worsted card, 60 inches wide. Some spinners are doing better than this, one manufacturer claiming 1,100 pounds a day. The ten hours' production of a

Noble comb on 1/4 blood stock or lower is about 700 pounds a day. Wages vary for tenders from $6.50 to $7.50 a week. This of course depends entirely on locality.

Rolls or Neps in Carding

I send you samples of twisted rolls or neps which form on our cards, when carding English 46s. These rolls form between fancy and doffer and can be seen dropping on the floor after having been drawn down by doffer. The speed of the tumbler has been changed, but without improvement. The card is 48 by 48 with 34 wire on cylinders. Fancy, 9 inches, 28s wire, open set. Altering position of workers has no effect. This difficulty is encountered with 46s grade only. Ralph (2182).

The idea that one style of card will do all classes of work has long been exploded; the best practice is to have special cards for special work, that is, within reasonable limits. Both coarse and fine cards will do a good range of work, but each style has its limit.

On careful examination of the rolls or fribs sent, it is found that they contain mostly the best and longest fibers, and are not, as might easily be supposed, composed of short, fribby wool.

Although they show themselves most at the finishing end of the card, that is, after the fancy has lifted the stock in the cylinder ready for the doffer, yet judging from the size of the fancy and supposing that other rollers

are of sizes in proportion, there is not the least doubt but that the nucleus of roll is formed farther back in the card. Whether this is so or not could be best judged by either seeing the card, or by knowing the size of roller, speeds, and counts of wire. Judging from the few details given it seems as if the best thing to do is to speed up the fancy, and to let it work lighter on the cylinder.

The sample sent, 46s, is as a rule a free open wool, and under ordinary circumstances easy to card giving a good, free and clear sliver. In fact this count is at the border line which divides low from fine grades.

Great care is required in scouring. If too lightly scoured there is a tendency to gumminess. If liquor is used too hot or too heavily charged with soap, it has a tendency to come to card lean and stringy.

With this grade of wool it is a good plan to run the doffers on both cards at a rather higher speed than is usual, so as to take all the wool well out of the cylinder. Though this produces a small sliver, it makes no difference to the weight turned out, the only difference being that more slivers must be put up at the backwasher to get the backwash sliver the right weight.

The wool itself does not require much carding. The fancy has not much work to do, for as a rule there is not a preponderance of

short fibers and the stock is easily raised from the cylinder.

A probable cause is that the fancy and workers are too small in diameter. It is a well known fact that the larger the diameter of the rollers in contact with one another both in carding and combing, the better the results. Although there may not seem much difference in contact between a 9-inch and a 12-inch fancy and the swift, yet in practice it is found that there is a great advantage in using the larger size.

The table of counts of wire and speeds gives what has proved to be a good machine for dealing with the quality or grade under discussion, besides being efficient in both higher and lower qualities within reasonable limits.

Clothing and speed of rollers for carding 46s to 50s or 52s X bred.

	Wire	Count	Crown	R.P.M.
1st Licker ...	Garnett	..	..	8½
2d Licker	24	60	6	12½
3d Licker	26	80	8	50
4th Licker	30	100	10	100
1st Divider	24	60	6	3½
2d Divider	26	80	8	3½
3d Divider	29	90	9	3½
4th Divider	31	110	10	4¼
1st Cylinder	31	110	10	100
1st Workers	32	115	10	3⅓
1st Strippers	27	80	80	277

1st Fancy	29	60	7	514
1st Doffer	32	115	10	4⅜
Angle Stripper ...	30	110	10	500
2d Cylinder	33	125	12	100
2d Workers	34	130	12	3⅓
2d Strippers	30	90	9	277
2d Fancy	31	70	7	516
2d Doffer	34	130	12	4⅜

Bradford.

Machinery for a Worsted Yarn Mill

We are planning to build a small worsted yarn mill (Bradford system) adapted for yarn of medium size and quality, say 2/32s to 2/36s, three-eighths and quarter blood. Please inform us what machines will be required to balance one set of drawing on such work.

South West (319).

A worsted yarn mill such as our correspondent has in mind would require worsted machinery as follows:

Preparatory and carding machinery: 2-bowl scouring machine, each bowl 18 feet long; 2 60 by 50 single cylinder cards; 2 self feeds; 2 single gill boxes; 1 ball winder; 2 combs; 2 can finishing gills; 2 single ball finishing gills; 2 Noble combs.

Drawing and spinning machinery: 1 revolving ball creel for 15 balls; 1 double can gill box set over 4 1/2-inch fallers; 1 2-spindle gill set over 4 1/2-inch fallers, bobbin, 14 by 9; 1 4-spindle drawing box, bobbin, 14 by 9; 1 6-

spindle weigh box, bobbin, 14 by 8; 1 8-spindle finisher, bobbin, 12 by 7; 1 8-spindle finisher, bobbin, 11 by 6; 16-spindle reducer, bobbin, 9 by 5; 4 32-spindle dandies, bobbins, 6 by 4; 6 160-spindle cap spinning frames, 3 1/2-inch pitch; 3 160-cap trap twisters.

Finishing Worsted Top

We are interested in the subject of finishing worsted tops and would like to get information covering the points of special importance.

T. S. & Co. (2113).

By finishing is meant every process after the fibers have actually passed through the pins of the combing machine. It applies to all classes of wool generally, but to the finer classes more particularly. Whatever class of wool is used, a carefully finished top will always have the preference as a marketable commodity. It is necessary, in order to get the best results, and to put a smart looking top on the market, not only to make sure that it is well combed, i. e., freed from all knots, neps, burrs, etc., and the fibers all laid parallel, but also that the sliver is even, ribbon-like and, without twisting, leaving the top, when it comes to the drawing process, without "clicking" or fraying of the edges.

After seeing that the pin work is in good order, circles truly set, and wool well put in, to ensure a clean combed sliver, the leather sheets on draw-off rollers demand attention.

When these become slightly worn and the sliver draws off with a curly edge, or if there is a tendency to cut the fiber, they should at once be replaced. There is no economy in running the sheets after they cease to draw a continuously even sliver. If the addition of a little weight to pressure springs does not effect this, the sheet should at once be discarded.

Sometimes an evenly drawn sliver when leaving the tin in which it has been coiled, will show in places a single fiber wrapped round the sliver. This is generally caused by some little roughness in the delivery plate of coiler. This can be remedied by working out the dent with a very smooth file. Inattention to this means broken fibers in passing through gill. Again, the tins into which the sliver is coiled should be frequently examined to see that there are no jagged edges to tear or break the sliver.

For fine, tender wools it is best to have a creel fastened to the first finisher, large enough to overhang the whole range of tins, with rollers over every row of tins. These assist the slivers and can easily be driven by gear from back roller of finishing box.

The guides in creeper plate should be so set as to deliver one inch narrower than the pinned-over part of fallers.

The pins in the fallers should be carefully looked after and kept in the best of repair.

Even with the best classes of wool waste accumulates between the pins and should be regularly cleaned out. If not, there is not only a tendency to irregular drawing, but bits of the waste will be caught by the front roller and if mixed with the sliver will injure it.

Blunt or split pins in the fallers detach fibers from the body of the sliver passing through the gill. On coming to front roller the loose fibers are rolled rather than drawn, and show badly when the sliver is closely examined. When putting new leather sheets on front rollers care must be used to put no more pressure on than is absolutely required.

In the case of dead-weighting the weights should be moved along the levers a little at a time and as soon as the rollers draw a nice free sliver no additional weight should be used, until required by the natural wearing of the leather. Where spiral springs are used the pressure should be increased in the same gradual way.

It is when the sliver has left the front rollers of the first finisher that moisture is added to make up for evaporation during the combing process.

It is advisable to have the first finishers set in a straight line, and at the same level. Thus a range of 8, 10, or even more boxes can be fed from one tank of water. At the end of the row of boxes the feed cistern, with ball

and stopcock feed, should be fixed. The pipe from this can be taken at or below the floor level and the troughs at the various boxes kept supplied by upright pipes.

The advantage of this method is that although every box can be geared for any desired amount of moistening yet by having a regulating overflow in feed cistern, the water level in all the boxes can be raised at once, without having to touch the gear in the case of a sudden rise of temperature.

The dampening roller should in all cases be made of brass to prevent rust, and be geared to the front roller in such a way as to be easily altered when required.

It is preferable to make the slivers from the first gill of such a weight that only two will be required to feed the second. Then by using the double guide the slivers are laid flat, one upon the other. This prevents the wild appearance which tops show at times when the slivers are fed side by side, and especially if a number of light slivers are fed instead of two heavy ones.

The same remarks apply to the second finisher as to first as regards the guides being narrower than bed of fallers, draft, pressure and care of leather sheet.

After the sliver has passed through front rollers in second finisher, another important point crops up, i. e., the folding of the edges of the sliver before finally passing and form-

ing part of the top. In cases where the tops have to be taken to drawing soon after combing much waste is likely to be made if this is not attended to. Various contrivances have been tried to overcome this difficulty, among them being revolving funnels, in some instances scored with a file, but this wraps one edge under and the other over the sliver and is apt to roughen the sliver as in the case of the coiler, already mentioned. Others have tried fixed funnels with triangular instead of circular holes. Another fairly successful method is to dispense with the funnel altogether and pass the sliver through a flat grid with folding bar set at an angle. About the best contrivance is the one known as Shaw's folder, in which the sliver passes over a broad bar whose surface is a section of a circle and is set well above the funnel. The sliver on leaving this bar has both its edges folded under by passing through the funnel. The edges meet in the center of the sliver and are always on outside of the top. Thus the next layer has its solid side pressed on this, and when the tops come to be used in drawing, the edges of the sliver are in no danger of fraying, "clicking," or causing breakage of the sliver or undue waste.

All tops which have to be packed should be neatly wrapped in brown or white packing paper, so that no dust or foreign matter can get on them.

Bradford.

Arrangement of Finishing Gill Boxes

I am interested in a plan for arranging finishing gill boxes and any particulars of boxes for low cross bred wool and for fine Botany. Why is it claimed that a one-story building is best for top making?

Nash (2168).

In setting out finishers ample room for the sliver cans should be left between the combs and first finisher, as 14 to 18 cans will be required to feed the first finisher. An overhanging creel should be fixed to the first box and so arranged that the rollers are over the center of each row of cans. This prevents dragging of the slivers. Great care should be taken that the conditioning rollers of all the boxes are at one level, otherwise uneven moisture will result. The first boxes should be single head and the second boxes double head.

For low cross breds the following sizes are suitable: First and second boxes, back roller, 3 inches in diameter; front roller, 2 1/2 inches in diameter; pitch of screw, 1/2 inch double thread, 13 fallers up, 3 down, pinned over 9 inches, 14 pins per inch, 17s wire, front pins 1 inch and back pins 7/8 inch above faller.

For Fine Botany: First and second boxes, back roller, 3 inches in diameter; front roller, 2 inches in diameter; pitch of screw, 1/3 inch double thread, 20 fallers up, 11 down, pinned over 9 inches, pins 17 per inch, 18s wire, front row 7/8 inch and back row 1 inch above

faller. A good spring balance near the second finisher is needed for testing the weight of tops.

A shed is preferable for combing and its attendant processes, as the sky-light falling on the machinery and material enables the worker to see the work better than with a side light.

Adams.

Bradford Numbers for Tops

I wish you would state for me the connection between the Bradford numbers, 40s, 60s, etc., used as quality numbers for tops and wool and the yarn numbers to which these designations will actually spin. A friend says Bradford sixties tops will produce a 60s 2-fold yarn. I know he is wrong.

Andrews (1223).

The connection is rather uncertain and remote in these days. The numbers given to tops are not necessarily an index of their spinning length. They are what "Andrews" calls them—"quality numbers." Thus there are plenty of so-called 60s tops which are neither fit nor intended to spin beyond 24s. They are "60s" only by virtue of the fineness and quality of the fiber; not because of its length. It has to be understood that any topmaker is at liberty to christen his blends as he likes and that the spinner judges not by the name, but by the sample.

Standards deteriorate in time and the de-

nominations given to tops do not signify what they used to. The deterioration is irregular, some makers keeping a better standard than others. Nobody thinks of trying to make 48s out of market 60s, but this length is often spun from 58s or 56s tops, the quality then being fine crossbred. If merino quality is wanted, 64s or a highly super 60s must be used. The numbers may be misleading, but so would they be if based exclusively on length without regard to fineness. Perhaps the least objectionable way out is found by those top-makers who offer samples under their own marks and let customers call them what number they please.

"Sixties" is the most ambiguous and artificial of names, but the case is not so very different with 40s. To spin 40s yarn a 46s top is taken for medium coatings. The nominal 40s top may not spin much beyond 20s, but good 40s colonial will go to 32s safely and good 40s English to 36s. There used to be an abundance of tops described as 32s, but the former 32s now masquerade as 36s and the 36s by one of time's changes have mostly become 40s. These changes date from twelve or fifteen years ago when crossbred material was excessively high in price.

"Names are nothing" say buyers emphatically and enough has been said to show that Bradford top numbers have to be interpreted with understanding. Every spinning mill has

its own individualities in the character of yarn turned out and yarns from different mills of one count and nominally one quality show different characteristics. "The sample is the thing," the buyers unanimously declare and this is so in yarn and cloth as well as in tops. Knowing the purpose in view, the topmaker of course submits the samples that are the most likely and may caution the spinner against using another of the same name. Similarly, the spinner will guard himself from claims by warning the manufacturer that such and such is not suitable for a warp-faced or a filling-faced fabric. In view of the immense diversity of cloths made from Bradford yarn a perfect standardization of tops must be a very long way off and any system of naming must have its pitfalls.

During 1907-8 an attempt to define details of the quality of Bradford tops was made by the staff of the Bradford Technical College. According to a table published in the quarterly report of that institution in April, 1909, the counts of yarn to which Bradford tops will usually spin are as follows:

Quality No. Tops.	Yarn Count Limit.
28s	16s
32s	24s
36s	28s
40s prepared	36s

40s carded	32s
44s prepared	40s
46s	40s
50s	44-46s
56s	48s
58s	50s
60s warp quality	48-50s
64s	56s
70s	80s
80s	100s
90s	150s

The table was compiled by Edford Priestley after experiments with a large number of samples with the idea of offering "a means whereby within reasonable limits" standards may be defined. In other words, the figures give a fair average which is not binding on anybody, but which is commonly attained in practice. Regent.

Loss in Scouring Yarn

What per cent. of the weight of unscoured yarn is lost in scouring? What is the difference in cost between scoured yarn and the same yarn in the grease?

Woolly West (81).

No definite answer can be given to the first question as the percentage varies with the quality of the stock and the amount of oil used in the manufacture of the yarn. The loss will vary from 5 to 20 per cent., and can

be easily tested by reeling 100 grains of the yarn, scouring and drying it, and then reweighing to determine the loss. The difference between the cost of scoured and unscoured yarn depends upon the shrinkage, and can be easily determined by dividing the cost per pound in the grease by the number of grains of scoured yarn obtained from 100 grains of the grease yarn. For instance, if the yarn cost 68 cents in the grease, and the test showed that there was a loss of 15 grains (or per cent.) in scouring, the cost per pound clean can be found by dividing 68 by 85, which would give 80 cents, the cost per pound scoured.

Help Required for and Production of the French and Bradford Systems

How much help would be required to operate the following worsted yarn machinery on the Bradford and French systems respectively? Would this amount of machinery give an approximate production of 100 lbs. per hour of 2/40s yarn from a half blood staple top?

FRENCH SYSTEM

1 Screw gill baller
1 First drawing frame
1 Second drawing frame
1 Third drawing frame
1 Reducing frame
1 Slubbing frame
1 Intermediate frame
1 Roving frame

2 Finishing roving frames
6 680-spindle mules.

BRADFORD SYSTEM

1 Screw gill baller
1 Can gill box
1 2-spindle gill box
1 2-spindle drawing frame
1 4-spindle drawing frame
1 8-spindle drawing frame
2 8-spindle finisher frames
4 16-spindle roving frames
8 32-spindle dandy roving frames
12 200-spindle spinning frames.

Would we require just one-half of the number of spindles for twisting that we do for spinning?

How much more yarn would be obtained by the French than by the Bradford system?

Bradford (1094).

In addition to overseer and helper for doing odd jobs the following help would be required for the French machinery:

	Operatives.
1st screw gill	1
1st and 2d drawing frame	1
3d and reducing frame	1
Slubbing	1
Intermediate	1
Roving	1
2 finishers	2
Total per set	8

Mules require:

1 mender
2 piecers
1 creeler.

This makes a total of 4 helpers for every 1,400 spindles.

The following help is required for the set of open drawing, Bradford system:

1st screw gill baller, 1 can gill box, 1 helper.

1 2-spindle gill box, 1 2-spindle drawing frame, 1 helper.

1 4-spindle drawing frame, 1 8-spindle drawing frame, 2 8-spindle finisher frames, 1 helper to these 4 boxes.

4 16-spindle roving frames, 1 helper.

8 32-spindle dandy roving frames, 2 helpers 4 boxes each.

The following help is required for 12 200-spindle spinning frames:

2 end lappers to follow doffers
1 bobbin layer
1 bobbin taker off
2 creelers, to put rovings in 6 frames each, and clean carriers
1 jobber
1 nipper to sweep floor, etc.
9 piecers to mind 2 sides each
2 piecers to mind 3 sides each end of the room
5 doffers.

The French and Bradford drawing should each turn out 100 pounds per hour. Of course, much depends on the staple, as to what drafting the fibers will stand. The better the top the heavier the turn out.

It is not necessary to have one-half the number of spindles for twisting that is required for spinning. The number of twisting spindles depends on the count and the number of turns of twist. Five or at the most six twister frames of 140 spindles each should handle easily the output of 12 200-spindle spinning frames. This would require:

8 helpers (twisters)
1 bobbin layer
1 taker off
1 assistant overseer.

The advantage in weight turned off would certainly be in favor of the French system, but no definite figures can be given. Always remember that the poorer the top, that is, the greater amount of short fibers, the greater will be the advantage of the French system.

John Brown.

Percentage of Cotton in Merino Yarn

How can I determine accurately the percentage of cotton or wool in merino yarn?

Rexford (1242).

The percentage of cotton in merino yarn is determined in the following manner: Weigh

a fair sized sample of the yarn, then sew it up in a small cheesecloth bag and boil the sample for 15 minutes in a 10 per cent. solution of caustic potash. Rinse the sample well, then squeeze out the surplus water by wringing in a cloth. What is left of the sample after this treatment is cotton, which should be exposed to the open air until dry and then weighed. A comparison of the weight before the treatment with the weight afterwards will indicate the percentage of cotton in the yarn.

Ex. A sample of merino yarn weighs 20 grains before boiling out, and 7 grains afterwards. Find the percentage of cotton. $7 \div 20 = 35$ per cent. cotton.

Card Clothing for Worsted Cards

Kindly give me particulars of card clothing for Botany and cross bred wools. Is it better to have a separate coiler for each card?

Emery (2157).

Each card should have a separate coiler, although in some mills one coiler has to serve for two cards, thus effecting a slight saving in the first cost. It has the drawback of not only causing cans to be changed oftener, but of having more and thicker piecings in the backwashing operation and in causing the cans to wear out faster.

The card clothing sets for Botany and cross bred wool is shown in the accompanying table.

For 64s Botany

Name of Roller	Wire	Counts	Crown
1st lickers-in	Garnett	..	..
2d lickers-in	29	90	9
3d lickers-in	30	100	10
4th lickers-in	32	115	10
1st divider	25	70	6
2d divider	29	90	10
3d divider	31	110	10
4th divider	32	120	10
1st swift	34	130	12
1st swift workers	34	135	12
1st swift strippers	31	110	10
1st swift fancy	31	70	8
1st doffer	35	140	12
Angle stripper	31	120	10
2d swift	35	150	13½
2d swift workers	35	150	13½
2d swift fancy	33	90	8
2d doffer	36	155	14

For 48s Cross Bred

Name of Roller	Wire	Counts	Crown
1st lickers-in	Garnett	..	..
2d lickers-in	24	60	6
3d lickers-in	26	80	8
4th lickers-in	30	100	10
1st divider	24	60	6
2d divider	26	80	8
3d divider	29	90	9
4th divider	31	110	10

1st swift	31	110	10
1st swift workers	32	115	10
1st swift strippers	27	80	8
1st swift fancy	29	60	7
1st doffer	32	115	10
Angle stripper	30	110	10
2d swift	33	135	12
2d swift workers	34	130	12
2d swift fancy	31	70	7
2d doffer	34	130	12

Curtis.

Setting of Fallers and Rollers

Should the bottom of pins in the fallers be as high as the back and front rollers on finishing gill boxes? Will wool of the same average length stand the same draft and also what is the usual draft on these boxes?

Brokaw (2153).

The back or feeding rollers, when properly set, should be at least 1/4 inch higher than bottom of pins in faller, as should also the front rollers. Much bad work is caused by front rollers drawing downward from gills, and the same evil obtains if the slivers are dragged in an upward direction in taking the wool as delivered by back roller. If the rollers are too low, they can be easily adjusted by putting a metal packing under the brass bearings, raising rollers to required level.

All wool of the same average length will not

stand the same draft. While it is advisable to use about as long a draft as the wool will stand, great care must be taken not to overdraft, otherwise the sliver will be uneven. This is easily detected by holding up the opened sliver to the light, when the thin places are plainly seen.

If too short a draft is used the sliver, although not as uneven, has a "pushy" appearance; the fibers do not lie well and instead of the clear appearance of a well drawn sliver it has a "muddy" look.

Apart from the draft between front and back rollers, the draft between back roller and faller has to be considered. The fallers should have just enough lead to secure the slivers being well laid into them, traveling say about 1 1/10 inches while back roller delivers 1 inch. There is no arbitrary rule for the draft, as loose, fluffy sorts require rather more draft on faller than the longer and straighter qualities.

McAllister.

Mill for Drawing and Spinning

Is a one-story shed preferable to a mill of several stories for drawing and spinning worsted yarns? What is the production of 4,000 spindles on the Bradford system on 2/28s knitting yarn and how many twisting spindles would be required? What would be the production on 60s filling yarns?

Sewell (2183).

For carrying on these processes a mill of several stories is preferable to a shed; first, because the rays of the sun do not beat upon the glass overhead and there is likely to be less variation in the temperature; second, the light comes from the side and enables the operative to see the fine threads as they pass from roller to bobbin better than would be the case with a sky-light.

A plant of 4,000 spindles will turn off 12,000 pounds per week of 2/28 knitting yarn and requires from 1,600 to 2,000 spindles to double them. Four thousand spindles will turn off about 5,000 pounds of single 60s weft for weaving purposes. Bradford.

Calculating Gill Box Drafts

I would like to have you explain the method of calculating the draft of a worsted gill box. I find many explanations of this subject in the various books on worsted drawing and spinning, but none that is clear to me. As a consequence I adjust the draft by trying different gears until the drawing is the right weight. I believe better results could be obtained if I knew how to calculate the drafts between back rollers and gills, and between gills and front rollers.

Worsted Comber (759).

The draft of a drawing or spinning frame is found by dividing the speed of the delivery rollers by the speed of the back or feed rollers. Thus if the front rollers deliver 10 yards

while the back rolls are taking in 2 yards the draft is $10 \div 2 = 5$. The calculation of the draft of a drawing or spinning frame consists in calculating the delivery and take-up speeds, and then dividing the former by the latter. These operations are simple, but are very imperfectly understood because writers on this subject have almost invariably contented themselves with giving reduced formulas of "driving" and "driven gears," omitting a clear explanation of the "reason why." As good a writer as McLaren states that "there are very few overlookers who know how to take gill-box drafts, as they find guess work more simple," and then gives a method of calculation based on a reduced formula that fails completely to explain the reason for the operations.

The underlying principle of draft calculations is simple, being a division of the delivery speed by the speed of the back or feed rollers. The calculations appear complicated because of the necessity of calculating these speeds from the sizes of several pairs of gears, the circumference of front and back rollers, and, in the case of gill-boxes, the speed of the gills.

For illustrating the calculation of gill-box draft we will take a can gill box geared as follows:

Front roller: 2 inches in diameter. 30 gear on back shaft driving a 50 gear on roller.

Back roller: 3 inches in diameter. 22 gear on back shaft into 72 gear; 18 gear into 88 gear on roller.

Fallers: Double thread screw, 3/8 inch pitch, is equal to 3/4 inch traverse per revolution of screw or back shaft.

Speed of front roller: (2 in. × 3.1416 × 30) ÷ 50 = 3.77 inches per revolution back shaft.

Speed of back roller: (3 in. × 3.1416 × 22 × 18) ÷ (72 × 88) = .59 inch per revolution back shaft.

Having found the speeds of front roller, back roller and fallers, the draft is calculated as follows:

Total draft: 3.77 in. (front) ÷ .59 in. (back) = 6.4, draft of machine.

Front draft: 3.77 in. (front) ÷ .75 in. (fallers) = 5, front draft.

Back draft: .75 in. (fallers) ÷ .59 in. (back) = 1.27, back draft.

The total draft is equal to the product of the front and back drafts:

1.27 (back draft) × 5 (front draft) = 6.35, total draft.

This method of calculating drafts is different from those given by most writers on the subject, but has the merit of being easily understood and, consequently, easily remembered.

When calculating the draft between two sets of rollers, the calculation of the circumference of the rollers by multiplying 3.1416

can be omitted and the diameter used as the circumference. The circumference must be used when making calculations of draft between rollers and fallers, because the surface speed of the rollers must be compared with the speed of the fallers.

. . .

I have read with much interest your answer to this question in your November issue and wish to say that I think your method of figuring is very simple and easily understood, and no doubt is theoretically correct. It would also be found correct in everyday practice if the rolls were smooth and we could do without the aprons, but as we must have fluted rolls and aprons, we have a condition that affects the draft a great deal more than most overlookers are aware. It is quite common to find the draft of a two-spindle gill box much shorter on one side than the other. This fault can be overcome a great deal if aprons of the same thickness are used. Some years ago I discovered that if I had my aprons in pairs I would get the drafts more even from the double can and the two-spindle gill boxes. However, I have never found any pair of aprons, even though they had been cut from the same hide, that would deliver absolutely the same draft, and for this reason I am a great believer in the use of the yardstick for ascertaining drafts.

This method is as follows: First, tie a piece of cord on the slubbing close to the twizzel of the flyer; second, measure one yard of the sliver behind the back guide (which is just outside of the back rolls); third, hold the finger and thumb on the sliver (36 inches from the guide); fourth, start the box and avoid putting any drag on the sliver. When the sliver has run into the back rolls one yard (finger and thumb up to the guide), stop the box and measure the number of yards and fraction of yards delivered. This will give the actual draft. For example, one yard in the back rollers and 6 1/4 yards between the cord and twizzel would mean 6 1/4 draft.

Thomas Hill.

Price of Top per Pack

I notice the price of worsted top quoted at Bradford as so many pounds and shillings per "pack." What is the meaning of this expression?

Packer (715).

A Bradford pack of top is 240 pounds. There are 240 pence in a pound sterling. Consequently the price of top in pence per pound corresponds with the price per pack in pounds sterling. If a pack costs £19, a pound costs 19 pence. Our English correspondent to whom this question was referred writes us as follows: "Bradford tops are bought and sold by the pack of 240 pounds, and you will

readily see how easy it is to reckon the cost in money of 1,000 packs, and the profit or loss on a deal, without a decimal currency."

Plans for a Combing Mill

We contemplate building a combing mill to supply our 4,000-spindle Bradford spinning plant. Can you give us a plan for this mill?
Hayes (2174).

No fixed rule for planning such a mill can be laid down and we will deal only with averages. Fine or thick counts, low, medium or fine wools, all make some difference both in the number of machines required and the amount of work turned out.

In laying out a combing shed it has been found economical to divide it into squares of 400 feet, 20 feet from pillar to pillar. This enables the machinery to be set to the best advantage and leaves room for the operatives to work and for the material to be moved from one process to another, with ample space for storage. The pillars also are at the right places for driving shafts without having to use unusually long lengths of belting. The arrangement also obviates a lot of counter shafting which would be required if the distance from pillar to pillar were either longer or shorter.

The wool enters the shed at J, Fig. 1, and passes through the process without turning

back. It enters the washing machine, A, then passes to the dryer, B, then to carding

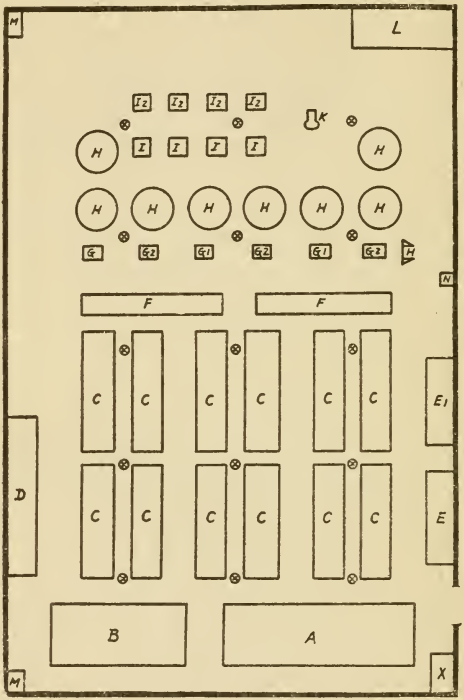

FIG. 1

machines, C, alongside of which are bins, D, for storing wool. On the right-hand side of

the cards are the grinding frames, E. These are partitioned off, thus preventing emery dust from flying about in the shed. After leaving the cards the sliver goes direct to the backwashers, F. Room for storing sliver cans is provided. From the backwashers the wool goes to the first and second gill boxes, G^1 and G^2. At the end of the row is the punch box, H. The sliver next passes to the combs, H, and then forward to first and second finishers, I and I^2.

The testing pan and scales are at K. These should always be near the combs and finishers so that both condition and weight of slivers and tear of combs can be readily ascertained. L is the comb maker's shop and storage for circles. Ample space is left for packing purposes, also for bench and tools required for small repairs. MM, lavatories for work people; N, raised cistern for condensed water from backwashers and combs.

The machinery consists of 1 washer, 1 drier, 12 cards, 2 backwashers, 3 first and 3 second preparing gills, 1 punch box, 8 Noble combs, 4 first and 4 second finishers.

John Brown.

Amount of Draft in Spinning

How is the draft used in spinning worsted determined? I would like if possible to have you give me a rule for this. Butler (2175).

The following explanation from The Wool Year Book for 1910 answers this question:

The draft used in spinning is determined by the count required to be spun and its relationship to the roving employed. If, however, a regular yarn is the prime consideration it is necessary that the roving should be of such a weight as to require only a small draft in spinning. The practice of spinning yarns of widely varying counts from rovings of one standard weight, though it has the advantage of convenience, is to be condemned. If carried out in the best way, it means that in the drawing, the rovings are made finer than is necessary for the low counts, and this is bad, for the material is unnecessarily drafted in the drawing; while for fine counts the rovings are not fine enough, and irregularities are produced through excessive drafting in the spinning. Though with good quality rovings long drafts are sometimes found to give fairly satisfactory results, it may be taken as an axiom that the draft in spinning must not exceed the fiber length of the roving.

In working out the calculations involved in drafting in the spinning process, the various considerations are illustrated in the following examples. For convenience both in calculating and in handling the material, 40 yards is taken as a basis. The weight of 40 yards of 1s counts is 18.3 drams, and, all other

counts being in direct proportion to this, this number is taken as a constant.

Rule. To obtain from given weight of roving the draft to produce required yarn, multiply count and weight of roving and divide by constant.

Example. What draft will be required on a 3.6 dram roving (per 40 yards) to spin 40s count?

$(40 \times 3.6) \div 18.3 = 8$ draft.

Rule. To find weight of roving necessary for required count of yarn with given draft, multiply constant by draft and divide by count.

Example. Find weight of roving to give 40s count with an 8 draft.

$(18.3 \times 8) \div 40 = 3.6$ dram, weight of roving.

Average Count of Yarn

Please state the correct method of calculating the average yarn number in a mill with spindles and production as follows:

2,000 spindles	40,000 lbs.	No. 10	yarn
8,500 spindles	60,000 lbs.	No. 30	yarn
4,000 spindles	20,000 lbs.	No. 40	yarn
	120,000 lbs.		

Durchschitt (186).

For all systems of yarn numbering based upon the number of hanks per pound, such as cotton, worsted and woolen runs systems, the

average number of yarn of different sizes is the average number of hanks per pound.

We will take the example cited by our correspondent for illustration. A mill has in a certain time produced 120,000 lbs. of yarn as follows:

lbs.		hanks.
40,000	No. 10 yarn	400,000
60,000	No. 30 yarn	1,800,000
20,000	No. 40 yarn	800,000
120,000		3,000,000

We find that there are 3,000,000 hanks in 120,000 lbs., or an average of 25 hanks per pound, which is the average count of the yarn.

The number of spindles in a mill is not a factor in the calculation; the pounds and counts of the different sizes of yarn are the only factors to be taken into consideration.

Scaife Lifter Motion

What are the advantages of the Scaife lifter motion and how are calculations made for spool building? Ranney (2172).

The Scaife motion is generally used for building up either double head, spool bobbins, or tubes on all frames, whether cap, fly or ring. It contains three distinct motions, each

simple in itself, which when combined seem rather complicated.

With the simple heart motion, also with the mangle-wheel, still used in some drawing boxes, it is possible to produce a bobbin with an equal thickness of weft over all its parts. By putting on an eccentric in place of the heart, spools which have the bulk of the weft in the center and tapering at both ends are produced.

The great advantage possessed by the Scaife is that not only will it build a spool of any shape required, but by throwing the slide motion out of gear ordinary double head bobbins of any traverse can be made. Spools can be made by simply exchanging the eccentric for a heart. Spare hearts and eccentrics are supplied stamped with the length of the traverse. Hearts are used not only in this but in other motions, such as traverse motions for comb leathers, for the reason that there is no dwell or dead part as is the case with cams and eccentrics. In tube building the advantage of the dwell is apparent, because at both long and short ends of its travel the motion is quicker, thus giving the pointed ends required in tubes.

The following calculations, supplied by Prof. Barker and E. Priestly, will no doubt be of great service to all who use Scaife motions:

For spool building. The amount of material taken up by the bobbin head with the

size of heart and pitch of scroll as employed must be found; also the speed of the heart in relation to the scroll or rack and the front rollers, necessary to build up the material in layers on the bobbin. The speed required to suit the front roller delivery can then be readily obtained by alteration of the change wheels of the motion. The gauge point is obtained as follows: The yarn capacity of a spool bobbin 5 inches by 3/4 inch with 1 1/4-inch head is about 239 grains. Divide 239 by 12.5 (grains per yard of 1s yarn). This result, 19.13, is the length of 1s yarn the spool will hold.

Then:

1st. Taking pitch of scroll and size of heart, find number of revolutions the scroll must make to fill bobbin.

2d. Multiply gauge point by counts being spun to find number of yards the bobbin will hold of count in question, and divide this equivalent by the revolutions scroll must make, the result being the number of yards required to form the head.

3d. Find diameter of the yarn by taking the square root of the yards per pound and divide this by the amount of filling space. Result: number of layers or speed of heart.

The relationship is now found between the speed of scroll, delivery of rollers, and speed of heart, but as the front roller speed is fixed by the twist required, the necessary changing

must be made at the heart and scroll. For example:

Spool 5 inches by 3/4 inch; 1 1/4-inch head; front roller, 12 1/2 inches in circumference; scroll, 1/2-inch pitch; heart, 1 1/4-inch traverse; yarn, single 40s.

(1) Revolution of scroll to fill 4 3/4 or 5-inch bobbin = 7.

(2) 19.13 × 40 (counts) ÷ 7 (scroll) = 109.3 yards taken up by bobbin head or by 1 revolution of scroll. Then 109.3 × 36 (inches per yard) ÷ 12 1/2-inch front roller = 314.7, revolutions of front roll to 1 of scroll.

(3) The square root of 40 × 560 is 150, the diameter of 1/40s count. Thirty-eight layers of yarn or movements of the heart are required for every quarter inch.

When changing from one count to another the changing is done at the heart shaft, thus affecting the whole motion. The varying factors are weight and twist. For example:

(Old No. × New Twist Wheel × Old Change Wheel) ÷ (New No. × Old Twist Wheel) = New Change Wheel.

The motion seems complicated, but by a little careful attention the various details can be mastered and the full capabilities of the motion made use of. Dobson.

Moisture in Worsted Yarn

We are manufacturing worsted goods for men's wear and buying yarn in Bradford by

"conditioned" weight, that is, allowing 18 1/4 per cent. for regain on "absolutely dry" weight. We have made a number of tests to determine the accuracy of the Bradford conditioned weight and find a wide difference between the Bradford figures and our own. When we have the yarn "absolutely dry," the weight is the same as the "absolutely dry" weight at Bradford, but when our test samples are exposed to the air they regain only 7 to 10 per cent., occasionally 12 per cent., leaving us short by 6 to 10 per cent. The weights of the different bales vary but slightly, but this may be due to the fact that they are tightly compressed and that the hold of the vessel in which they are stored is fairly dry. It seems to me that the Bradford standard of 18 1/4 per cent. gives an unfair advantage to the Bradford merchant, and that the American purchaser of Bradford worsted yarn is paying for something that is not delivered. If the price were based on "bone dry" weight it would be different. I would like to know whether I am right in this view of the case?

Lachine Rapids (760).

Our correspondent is wrong. The failure of his conditioned yarn to regain the 18 1/4 per cent. is due to the fact that drying wool at the high temperature used for conditioning partially destroys its power to absorb moisture. If, as he suspects, the Bradford yarn contained more moisture than is "natural" in Canada, the yarn would lose weight when opened up and exposed to the Canadian air, the counts becoming finer; but, as we understand his inquiry, this is not the case, his complaint being

based on the failure of the small lots tested for condition to regain the 18 1/4 per cent.

This amount, 18 1/4 per cent., was first adopted and legalized on the Continent as a standard regain for worsted, probably because it was supposed to represent the average regain under ordinary atmospheric conditions. This standard has been generally adopted by the English trade, although we believe it has not yet been established in England by statute law. Prolonged tests to determine the "average natural condition" of worsted yarn at Lawrence, Mass., have been made by Wm. D. Hartshorne at the Arlington Mills in that city. The results of his experiments were given in a paper read at the Atlantic City meeting of the New England Cotton Manufacturers' Association, from which the following extract is taken:

"A skein of worsted yarn was prepared whose absolutely dry weight was carefully determined by weighing and testing other skeins of the same material under exactly similar conditions. This skein was then hung up in an open shed, protected from the sun and rain, but with good ventilation, so that it could be considered as fairly representing the outdoor conditions. Its weight was then carefully taken and recorded ten times a day, at approximately equal intervals for every day in the year except Sundays and holidays, for a period of one year from May 1, 1895. A

record was also kept of the temperature and relative humidity, as obtained from the readings of a set of wet and dry bulb thermometers, located within a few feet of this skein of yarn, and taken at the time of each weighing, except for a short time in the winter, when the humidity observations were omitted owing to the difficulty of obtaining them accurately at low temperatures. The variations in the weight of this skein were remarkable, ranging from a little over 7 per cent. to as high as 35 per cent. on the original dry weight. There were occasional variations of 15 or even 19 per cent. in 24 hours."

The average of Mr. Hartshorne's observations for the year were summarized by him as follows:

May, 1895	14.86 %
June, 1895	16.87
July, 1895	18.05
August, 1895	17.31
September, 1895	17.29
October, 1895	16.76
November, 1895	22.02
December, 1895	19.28
January, 1896	17.40
February, 1896	17.21
March, 1896	17.21
April, 1896	14.15

17.45 for year as averaged by the month.

This Lawrence average regain of 17.45 per cent. for the year is very close to the European standard, the difference being but 7/10 per cent. If Mr. Hartshorne had made the tests in Europe instead of in America the resulting average of 17.45 per cent. would have rightfully been taken as indicating the 18 1/4 per cent. standard to be a very close approximation to the "natural standard."

While "Lachine Rapids" is wrong in his deduction from the failure of his test lots to regain the 18 1/4 per cent., his inquiry suggests a very important line of investigation to determine the natural condition of moisture in worsted yarn in different parts of America. It is very desirable that the same standards of regain for textile materials be adopted in all countries, and if there is no good reason for the adoption of different standards, then those already established in Europe should be accepted in America. As far as the price is concerned it makes no difference to either buyer or seller what the standard of regain is as long as it is generally accepted throughout the trade and prices are made by every one to conform to it. The use of two standards for the same material would, however, be confusing and open the door to never-ending vexation and fraud.

We hope Lachine Rapids will make a series of tests along the lines followed by Mr. Hartshorne at Lawrence, in order to determine the

average natural condition of worsted yarn in Canada. We believe the results of such tests would indicate, as did the tests made at Lawrence, that the difference between European and American atmospheric conditions does not warrant Americans in changing the established standards of regain, which are as follows for the various textile materials:

	per cent.
Worsted yarn	18¼
Woolen yarn	17
Scoured wool	16
Noils	14
Shoddy yarn	13
Jute	13¾
Flax and hemp	12
Silk	11
Cotton	8½

The practice of selling textile material by conditioned weight, which generally prevails in Europe, has not been adopted to the same extent in the United States. Here it is confined mainly to raw silk, all of which is imported and most of which is bought abroad by conditioned weight. The New York Silk Conditioning Works, New York City, were established in 1880 and are equipped with facilities for handling all kinds of textile materials. We submitted to this establishment the question asked by Lachine Rapids, and asked what

standards they had adopted, receiving the following reply:

"In reply to your favor of October 10 we beg to state that in our experience fiber that has been thoroughly dried out will not regain as readily as before this process, and unless the fiber is stored in a damp place it will not contain the legal or commercial percentage of moisture allowed. The standards used in this country are the same as those adopted in Europe. Yours truly,

"New York Silk Conditioning Works."

As the European standards have thus been adopted by the New York Silk Conditioning Works and are established in Canada, it is very desirable to keep them unchanged unless a change is made at the same time in all other parts of the world.

Moisture in Worsted Yarn

I note what you say in your November issue on this subject and yet feel that more can be said. Take a shipment we have just received of worsted yarn. It went to the Bradford conditioning house as 12,226 pounds. The weight given by the conditioning house was 12,533 1/2 pounds and it weighed on our scales 12,260 pounds in the original bales. Now here is a loss to us of 273 1/2 pounds in yarn (or something else), and a gain to the maker of the yarn of $141.45 for goods he did not deliver.

It appears to me that though a method may have been in use for some years and even be accepted generally, that is no reason why an

improvement may not be introduced. As example, take the "London Clause" on goods entering London by boat. I never heard a satisfactory reason for it and I now believe it is cut out. Why cannot worsted yarn be sold at a "bone-dry" price? If it is bone-dry in Bradford it will be the same weight as bone-dry in Canada or Mexico. Another reason which comes into consideration, bone-dry will be a clean yarn, and so the buyer is not paying for any too much oil or dirt. Again, we have some yarns of an open nature that absorb a much greater percentage of moisture than another yarn of an equal weight when dry. That is especially true of lofty yarns.

Where does the agent come in? We have seen yarns stored in cellars in this country weigh more than the conditioning papers allowed and in comparison with yarns made on this side—count, stock, and fabrication being equal—were dearer at 41 cents than domestic at 46 cents a pound. Does anything suggest itself from these points?

Lachine Rapids (776).

"Lachine Rapids" is mistaken. He asks: "Why cannot worsted yarn be sold at a 'bone-dry' price?" It is in fact sold on a bone-dry basis when sold by conditioned weight. Conditioned weight of worsted yarn is bone-dry weight plus 18 1/4 per cent. The worsted yarn trade of Europe is based on this standard and prices have become adjusted to it under the law of supply and demand. Let us take the shipment just received by "Lachine Rapids" and assume for illustration the purchase price to have been 60 cents a pound,

conditioned weight. The conditioned weight is 12,533 1/2 pounds, which represents a bone-dry weight of 100 per cent. plus 18 1/4 per cent.; or a bone-dry weight of 10,600 pounds plus 1,933 1/2 pounds. The market price by conditioned weight being 60 cents a pound conditioned weight, the entire shipment cost $7,520.10. This is equal to 70.94 cents a pound, bone-dry weight. That is the bone-dry price for the lot established by supply and demand, and is the same as 60 cents a pound, conditioned weight, based on a regain of 18 1/4 per cent.

This shipment weighed 12,226 pounds in Bradford. The bone-dry weight was, however, 10,600 pounds; consequently the actual regain on Bradford was 15 3/10 per cent., the lot containing 10,600 pounds of bone-dry yarn and 1,626 pounds of water. But worsted prices are not based on a regain of 15 3/10 per cent. If they had been, supply and demand would have adjusted the price per pound so as to make the total value of the shipment $7,520.10, the same as it is now. The price per pound, Bradford weight, would then have been 61.59 cents, making the 12,226 pounds amount to $7,520.10.

So with the Canadian weight of 12,260 pounds. The bone-dry weight in Canada is 10,600 pounds, the same as in Bradford. The actual moisture in Canada was, however, slightly greater, the bone-dry weight being

10,600 pounds, the actual moisture 1,660 pounds, an actual regain of 15 7/10 per cent. The total value of the shipment, based on first cost, remained the same, $7,520.10, equal to 70.94 cents a pound, bone-dry, or 61.34 cents a pound, Canadian weight.

If "Lachine Rapids" should insist on buying directly by bone-dry weight his compatriots in Bradford could easily accommodate him by charging 70.94 cents a pound bone-dry, where they now charge 60 cents, conditioned. Or if he should insist on buying by actual Bradford weight they could easily accommodate him by charging 61.59 cents a pound, Bradford weight. In the former case "Lachine Rapids" would get 1,626 pounds more in Canada than he paid for; in the latter case, 34 pounds more than he paid for. In either case he would have to reduce his bank account by exactly the same amount, $7,520.10, in order to cover the first cost, as he has now when he is receiving 273 1/2 pounds less than he has paid for by the pound.

No one standard of regain would agree with the varying degrees of regain at different times and in different places. The worsted trade has adopted 18 1/4 per cent. for worsted yarn and prices have been adjusted to it by supply and demand. It would not improve anything to change it as prices would then go up or down to conform to the change. Then why not leave it alone and avoid the endless

confusion and fraud that would result from trying to change it?

We wonder if we have convinced "Lachine Rapids." If not, then we suggest this idea to him: When he buys worsted yarn by conditioned weight he is paying for 13.53 ounces, bone-dry, the price that is charged to him for what is called a pound, conditioned weight; 13.53 ounces is 100 per cent.; 2.47 ounces is 18 1/4 per cent.; 16 ounces is 1.18 1/4 per cent.; 13.53 ounces is a bone-dry pound of conditioned worsted.

While the particular standard adopted for conditioning makes no difference to the buyer and seller as long as it is agreed upon, yet it is very desirable that the variation in the actual regain in the different parts of America should be determined. With a view of getting this done we have suggested to the National Bureau of Standards at Washington that they take up this work. We have received a favorable response from the director who states that the matter is receiving his attention and that the work will be taken up at the earliest opportunity. We would suggest to "Lachine Rapids" that he use his influence to get the Canadian authorities to engage in the same work in order that as wide a territory as possible be covered by the official American tests.

Meaning of Merino

What is the original meaning of the word "Merino" and how many meanings has it at present? Enquirer.

Merino is originally a Spanish word and is the title of the overseers of cattle pastures and of certain judicial officers. According to the highest Spanish authority, merino sheep are a breed of sheep which are pastured in the winter in Estremadura and in summer in the mountains. This explanation by the Spanish Academy discountenances the idea that merino was in some way related to "marina" the sea. Estremadura is not even a seaward province of Spain, but a south-central one on the Portuguese frontier. Some of these sheep were imported into England by George III. in 1786 and were used by leading breeders, and animals of the same strain were exported to the colonies. A historian of the worsted trade has supposed these sheep from Spain to be the improved pedigree of certain sheep sent from England in the time of Edward III. There are no conclusive proofs that the breed was directly developed from the type of sheep found in England before the Norman invasion.

The connection between "merino" applied to sheep and "merino" applied to wool is clear, but men in the textile business do not call merino wool by that name. Merino is admittedly the proper name, but the worsted trade

prefers to call it "botany"; which name is derived from Botany Bay, New South Wales, formerly a convict settlement. In the Yorkshire woolen trade, one hears more often of "Port Philip" wool or "Cape" wool than of merino. The Scotch woolen trade calls merino "Saxony" and classifiies the coarser wools as "Cheviots." About the same time that Spanish sheep were brought to England some were sent to Saxony, were well-handled there and became a source of supply to British manufacturers. In all three instances the tendency to call wools by the names of the points they came from, rather than by the family name, is apparent.

Merino is a standard name in the rag trade and a request for samples of merino wastes brings samples of pulled gentlemen's suitings and of marino quality. One of the chief concerns in the Dewsbury district bears the name Extract Wool & Merino Company; extract wool is of course carbonized fiber, free from cotton.

Merino in the knit goods business has a different signification. An unwritten law bids the Englishman: "If you find a good name, take it." That law explains why merino hosiery means goods composed of wool and cotton; also why "lamb's wool" hosiery very often means low-grade shoddy woolen and why "llama" and "cashmere" knit goods have

usually no connection whatever with goat's hair.

Merino is also the name of a weave. Merino, or French merino, means to the dress goods man an all-wool fabric, single warp and single weft, twilled both on the back and face and differing only from cashmere in that the latter has a twill face and a plain back. Samples of what are sold as merino dress goods at the present day are sent herewith.

The meaning of "merino" in this connection has turned a complete somersault within the last century. James in his "History of the Worsted Trade" shows that prior to 1826 a worsted cloth known as "plainback," made from relatively heavy yarn, had been originated by James Aykroyd & Sons, Brook House, Ovenden, Halifax, and had been made in large quantities by several manufacturers. In that year Todd, Morrison & Co., London (now the Fore Street Warehouse Co.) communicated to Mann, a Bradford merchant, their idea that a "plainback" made with the finest merino yarn would sell well. Mann employed the Garnetts of Bradford to carry out the work and they made a fabric twilled on the face and plain on the back, using 40s-52s filling and 32s-38s warp in 27-inch width, selling at prices between 75 and 80 shillings ($18 to $19.20) a piece (probably of 28 yards). Six-quarter goods were introduced in the following year

and these improved plainbacks became known far and wide as "merinos." The inversion of the meaning of what was clearly a well-defined term may presumptively be attributed to contact with French practice. French merino dress goods are the only ones now met with in the market and the samples sent are evidence that they are not all made of merino wool.

James Strand.

French and Bradford System of Yarn Spinning

Would it be profitable for a manufacturer of French spun yarn to comb it on a Noble comb? Would it be profitable for a manufacturer of Bradford spun yarn to equip his drawing room with the French system, providing the material is fit for it?

Dayton (1283).

Bearing in mind the last sentence, the answer to the first part of the question is yes. Some of the largest and best equipped firms who make mule spun yarns use both Nobles, square motion and the rectilinear comb, or some modification of the Heilmann comb. Presuming that "Dayton" makes dry spun yarn, that is without oil in combing, he will get good results from ordinary well grown Botany wool, say 56s and upwards, by using the Noble comb. The one advantage is that it makes no backings and when the stock has

passed through the comb, the result is top and noil only. The drawback is that in the slivers from large and small circles, owing to the way the slivers from the punch box are fed on the comb, have the fibers lying in opposite directions. This does not make much difference except in very fine counts.

Owing to the absence of twist in French drawing very short stock could not be worked on cap or fly frames. But with fairly shafty sorts it can be and is done to some extent. Instead of the ordinary pin rail for holding the rovings, a creel is substituted, the bottom rail of which has small countersunk holes for the pointed spindle to rest in, while the top rail has slight notches for the top part of spindle to rest against and to keep it from slipping out of position, with as little friction as possible.

Another way is to use the ordinary spindle rail in a loose washer running on ball bearings at the foot of each spindle. For very short and tender wools it is preferable after French drawing to spin on mules. J. B.

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